

Appl. No. : 09/386,247
Filed : August 31, 1999

- 56E-7
6. (As Filed) An ozone shower system, comprising:
an ozone source configured to supply ozone to a process chamber;
a sprayer connected to a fluid source such that fluid sprays over a workpiece in the process chamber;
a pump connected to the fluid source; and
a selector valve connected to the pump, the selector valve configured to selectively pulse the fluid through the sprayer.
 7. (As Filed) The ozone shower system of Claim 6 wherein the workpiece is a semiconductor wafer.
 8. (As Filed) The ozone shower system of Claim 7 further comprising a cassette that holds a plurality of semiconductor wafers.
 9. (As Filed) The ozone shower system of Claim 8 wherein the cassette is configured to rotate.
 15. (Previously Amended) A reaction chamber comprising:
a gas input;
a plurality of nozzles connected to a nozzle manifold;
a wafer cartridge holding wafers;
a first fluid line supplying fluid to the nozzle manifold; and
a second fluid line capable of diverting the fluid away from the first fluid line.

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16. (Previously Amended) A reaction chamber which removes a portion of a semiconductor workpiece by applying an intermittent fluid to the portion during removal, the reaction chamber comprising:

at least one nozzle connected to a fluid supply and configured to pulse fluid onto a semiconductor workpiece; and

a rotator capable of rotating the semiconductor workpiece during a removal of a portion of the semiconductor workpiece at a velocity not exceeding 100 revolutions per minute (RPM).

17. (As Filed) An apparatus comprising:

at least one wafer processing chamber wherein an ozone rich environment exists within the wafer-processing chamber;

a sprayer; and

a pulsating fluid source, the pulsating fluid source configured to pulse a solution through the sprayer into the ozone rich environment.

18. (As Filed) The apparatus of Claim 17 wherein the solution is ozone rich.

19. (As Filed) The apparatus of Claim 17 wherein the solution combines with the ozone in the ozone rich environment.

20. (As Filed) The apparatus of Claim 17 wherein the sprayer comprises a plurality of spray nozzles.

22. (As Filed) The apparatus of Claim 17 wherein the pulsating fluid source is configured to pulse at approximately one pulse every two seconds.

61 23. (Amended) The apparatus of Claim 17 wherein the pulsating fluid source is configured to pulse at range from approximately one pulse every two seconds to approximately five pulses every minute.

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24. (As Filed) The apparatus of Claim 17 wherein the pulsating fluid source has a 50% duty cycle.

26. (As Filed) The apparatus of Claim 17 wherein the pulsating fluid source have a duty cycle the varies from 3% to 97%.

27. (As Filed) An apparatus comprising:
at least one semiconductor processing chamber; and
a pulsating fluid source, the pulsating fluid source configured to pulse an ozone-rich solution into the semiconductor-processing chamber.

28. (As Filed) The apparatus of Claim 27 wherein the ozone-rich solution further combines with ozone in the semiconductor processing chamber.

29. (As Filed) The apparatus of Claim 27 further comprising a spray nozzle that directs the pulsating fluid into the semiconductor-processing chamber.

31. (As Filed) The apparatus of Claim 27 wherein the pulsating fluid source is configured to pulse at approximately one pulse every two seconds.

C2 32. (Amended) The apparatus of Claim 27 wherein the pulsating fluid source is configured to pulse at range from approximately one pulse every two seconds to approximately five pulses every minute.

33. (As Filed) The apparatus of Claim 27 wherein the pulsating fluid source has a 50% duty cycle.

35. (As Filed) The apparatus of Claim 27 wherein the pulsating fluid source have a duty cycle the varies from 3% to 97%.

63. (As Filed) An apparatus for removing a portion of a semiconductor workpiece, the apparatus comprising:
a fluid source capable of varying a fluid from a greater flow to a lesser flow, wherein a duty cycle of the varying fluid comprises an amount of time the fluid flows at the greater flow versus an amount of time the fluid flows at the lesser flow plus the amount of time the fluid flows at the greater flow;
one or more nozzles capable of spraying the varying fluid over a workpiece;
and
a platform capable of rotating the workpiece at one or more speeds to, in conjunction with one or more duty cycles of the varying fluid, control a thickness of a boundary layer of the varying fluid on the workpiece,
wherein the thickness of the boundary layer increases an amount of ozone that is transferred to the workpiece and wherein the ozone and the varying fluid enhance the removal of a portion of the workpiece.

64. (As Filed) The apparatus of Claim 63, wherein the lesser flow comprises substantially no flow, thereby creating a pulse of fluid during the greater flow.

66. (As Filed) The apparatus of Claim 63, wherein the varying fluid varies from the lesser flow to the greater flow at approximately one time every two seconds.

67. (As Filed) The apparatus of Claim 63, wherein the varying fluid varies from the lesser flow to the greater flow at a range of approximately one time every two seconds to approximately five times every minute.

68. (As Filed) The apparatus of Claim 63, wherein the one or more duty cycles include a 50% duty cycle.

70. (As Filed) The apparatus of Claim 63, wherein the one or more duty cycles include a range of duty cycles between 3% and 97%.

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71. (As Filed) The apparatus of Claim 63, wherein the one or more duty cycles vary between 3% and 97%.

72. (As Filed) The apparatus of Claim 63, wherein the one or more speeds include a range of speeds from not exceeding approximately 100 revolutions per minute (RPM) to stationary.

73. (As Filed) The apparatus of Claim 63, wherein the one or more speeds vary between approximately 100 RPM and stationary.

74. (As Filed) The apparatus of Claim 63, wherein the one or more speeds include stationary.

75. (As Filed) The apparatus of Claim 63, wherein a temperature of the varying fluid ranges from approximately 20°C to approximately 95°C.

76. (As Filed) The apparatus of Claim 63, wherein a temperature of the varying fluid ranges from approximately 60°C to approximately 95°C.

79. (As Filed) The reaction chamber of Claim 16, wherein the velocity comprises a stationary velocity.

REMARKS

Claims 6-9, 15-35, and 63-79 were pending. In the present Election of Species, the Applicants have canceled Claims 21, 25, 30, 34, 65, 69, and 77-78. Claims 6-9, 15-20, 22-24, 26-29, 31-33, 35, 64, 66-68, 70-76, and 79 remain pending for consideration.